

ABSTRACT OF THE DISCLOSURE

A method and apparatus are provided for improving the performance of branch prediction using a combination of a speculative branch target buffer (SBTB) and an architectural branch target buffer (ABTB). According to one embodiment, speculative
5 branch data is maintained for in-flight branches (i.e., those that have been fetched but not yet retired). A branch entry is speculatively allocated in a line of the SBTB after decoding an instruction containing a branch, such as a conditional branch, a return from a subroutine, a call to a subroutine, or an unconditional branch. Subsequently, the branch data associated with the branch entry is speculatively updated after branch prediction has been completed
10 for the branch. Finally, the branch data is corrected after the branch has been executed. According to another embodiment, a novel branch prediction circuit includes both a speculative branch target buffer (SBTB) cache and an architectural branch target buffer (ABTB) cache. The SBTB cache contains multiple branch entries to maintain speculative branch data associated with in-flight branches. The speculative branch data includes a
15 speculative history of taken/not-taken outcomes associated with the in-flight branches. The ABTB cache is coupled to the SBTB cache. The ABTB cache also includes multiple branch entries, however, they are for maintaining architectural branch data including the actual taken/not-taken outcomes associated with retired conditional branches.